

REMARKS

The courtesy extended by the Examiner to Applicants' counsel during a phone call on October 25, 2004, is gratefully acknowledged. The patent number for Yu et al. had been inadvertently omitted from the Office Action, and was provided by the Examiner.

Claim Rejection under 35 USC § 103

Claims 1-4 were previously allowed, but are now rejected under 35 U.S.C. § 103 as unpatentable over Japanese patent publication 2000-329488, by Kikuchi, in view of United States Patent No. 5,579,837, issued to Yu et al. in 1996.

Kikuchi shows a tube body 2 surrounding a corrugated inner fin 3 and comprising a joint, referred to in the translation as butt part 1. The rejection points to Figure 5. In Figure 5, the butt part is formed between planar sections received in a conforming channel in the fin, such that the sides of the channel are bonded to the adjacent wall surfaces. The resulting compound wall is thus formed of fin section bonded to a tube section bonded to a tube section bonded to a fin section, with planar bonds of substantial area corresponding to the width of the tube. In contrast, Applicants' tube comprises abutted walls having out turned feet. The walls are received in a channel that is widened to accommodate the feet. As a result, the fin is spaced apart from the side of the wall, thereby forming an additional passage. Kikuchi does not show walls having curved feet, or provide clearance to accommodate walls having curved feet. Thus, Kikuchi does not

show Applicants' invention.

Yu et al. shows a tube 12 comprising leg portions 48, 50 having curved ends 52, 54, see Figs. 4 and 5 D, and col. 3, lines 13-34. The curved ends are bonded to the opposite tube wall, dividing the tube into passageways 40, 42. Yu et al. does not show a corrugated fin within the passageways. Presumably, any such fins, if desired, would be inserted into each passageway after the tube is manufactured, by the method described by Yu et al. at col. 1, lines 23-26. It is significant, though, that Yu et al. forms a bond directly between the ends 52, 54 and the base 30. Nothing in Yu et al. contemplates interposing a fin between the ends and the base. More particularly, nothing in Yu et al. shows disposing the leg portions within a channel in a single fin inserted into the tube prior to brazing, key features of Applicants' invention. Thus, Yu et al. does not teach or suggest Applicants' invention.

The rejection proposes to combine the references by modifying Kikuchi to include the curved ends in Yu et al. However, the teachings of the references themselves do point away from this combination. The practitioner would appreciate that a critical factor for heat exchanger tubes is the ability to withstand internal pressure, sometimes referred to as burst strength, as distinguished from compressive strength. Yu et al. achieves its burst strength by bonding the leg portions directly to the opposite base, without a fin, and particularly without a fin interposed between the leg portion and the base. In Kikuchi, the squared off end of the butt part is not conducive to forming a strong braze bond. Instead, Kikuchi relies upon the fin, with the corrugations bonded to the walls at regular

intervals, to increase burst strength. In Fig. 5, Kikuchi compensates for the poor bonds at the end of the butt part by providing large area bonds to the sides. To increase the intermediate channel in Kikuchi would eliminate the side bonds and dramatically decrease the internal pressure strength. (It is noted that, in other embodiments in Kikuchi, such as Fig. 4, which rely solely on the fin without the end bond, strength is maintained by regular spacing within the fin.) Thus, Kikuchi does not point the practitioner to widen the intermediate channel. Without widening, the channel does not accommodate curved feet. Thus, even if the references are combined, there is nothing to lead the practitioner to reduce the bond strength in Kikuchi by widening the intermediate channel as needed to receive curved feet, or to eliminate the direct bond by interposing the fin in Yu et al., so as to arrive at Applicants' invention.

Claim 1 is directed to Applicants' heat exchanger comprising an outer shell having abutted walls, and an inner web. As recited in the claim, each abutted wall has an out turned foot with a curved undersurface. The inner web comprises an intermediate channel with a width twice the width of the out turned foot. The channel is brazed to the undersurfaces to indirectly join the upper wall to the lower wall. Yu et al. provides a direct bond, without the fin and so without a widened intermediate channel. Kikuchi gets strength from the side bonds, and so does not suggest widening the channel to eliminate the side bonds. Thus, the references do not suggest Applicants' invention in claim 1.

Claims 2-4 are dependent upon claim 1, and not suggested by the reason set forth with regard to that claim. In addition, it is pointed out that claim 4 calls for braze

material only on the outer surface of the tube walls. Neither Kikuchi nor Yu et al. show this feature, further distinguishing claim 4.

For these reasons, it is respectfully requested that the rejection of the claims based upon Kikuchi and/or Yu et al. be reconsidered and withdrawn, and that the claims be allowed.

Conclusion

It is believed, in view of the remarks herein, that all grounds of rejection of the claims have been addressed and overcome, and that all claims are in condition for allowance. If it would further prosecution of the application, the Examiner is urged to contact the undersigned at the phone number provided.

The Commissioner is hereby authorized to charge any fees associated with this communication to Deposit Account No. 50-0831.

Respectfully submitted,



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